

REMARKS

OVERVIEW

A request for continued examination accompanies this amendment. This amendment cancels claims 1-4 and 6-21. Claim 5 had been previously cancelled. Therefore all prior rejections to the claims are moot. This Amendment introduces new claims 22-37 to more particularly point out and distinctly claim the subject matter of the invention.

Although there are, of course, no outstanding rejections to any of these new claims, the references previously relied upon to reject claims 1-4 and 6-21 are discussed and distinguished for the convenience of the Examiner in an effort to expedite examination of this case as it is respectfully submitted that all claims are in proper form for immediate allowance.

SPECIFICATION

The specification is corrected to be consistent with figure labels and is further corrected to clarify that experimental data is from Pt resinate, not Pt powder.

ISSUES UNDER 35 U.S.C. § 103

JP 04041676 teaches the oxidation stability of a Pt Ni alloy heat treated for 10 minutes at 350°C in air and 10 minutes at 700°C under a reducing atmosphere. This alloy showed oxidation resistance at 1000°C. However, the weight ratio of Pt to Ni was 90/10. Pt is more oxidation resistant than Ni so it is expected that such a Pt rich sample would exhibit enhanced oxidation resistance.

A difference between JP04041676 and the claimed invention is that the proportion of Pt to Ni in the alloys is much greater in JP04041676 than in the claimed invention, 90 wt. % Pt compared to no more than 10 wt. % Pt. With such a Pt rich alloy, the oxidation resistance detailed in JP04041676 is unsurprising. What is surprising is that the low Pt (high Ni) alloys of

the claimed invention exhibit excellent oxidation resistance. The other main difference is that JP04041676 forms the Pt/Ni alloy from resins, that is, solutions containing Pt and Ni ions. Therefore, the Pt and Ni are already intimately mixed before the mixture is heated under a reducing atmosphere to form the alloy. This decreases the time and temperature needed to form the alloy. The claimed invention forms an alloy between nickel powder and a Pt resin. Rather than forming a homogeneous alloy, it is thought that the Pt forms an "eggshell" structure around the Ni particles, the "shell" composed of a Pt rich alloy and the interior of the egg composed of a Ni rich alloy. This structure allows Ni to be protected against oxidation with a minimum quantity of Pt.

GB2242203 teaches the reduction of deposited compounds to metal so that they may form an alloy. The reduction may use a gas phase reducing agent such as hydrogen. This reduction may take place concurrently with a heat treatment of approximately 600°C to 1000°C. Significantly, this reference teaches that heat treatment temperatures above 1000°C are to be avoided. A Pt/Ni alloy is disclosed, but it is formed in only a nitrogen atmosphere, not a reducing atmosphere. Furthermore, the Pt to Ni weight ratio is 3.3/1. Pt is more oxidation resistant than Ni so it is expected that such a Pt rich sample would exhibit enhanced oxidation resistance.

The difference between GB2242203 and the claimed invention is that the proportion of Pt to Ni is much greater in GB2242203 than in the claimed invention, 70 wt. % Pt compared to no more than 10 wt. % Pt. Furthermore, the heat treatment to form the alloy is at a lower temperature (600°C to 1000°C compared to 1000°C to 1300°C) in GB2242203 than in the claimed invention. The oxidation resistance of the alloys formed in GB2242203 is not reported although with such a Pt rich alloy, good oxidation resistance is expected. What is surprising is

that the low Pt (high Ni) alloys of the claimed invention exhibit excellent oxidation resistance. The other main difference is that GB2242203 forms the Pt/Ni alloy from resins, that is, solutions containing Pt and Ni ions. Therefore, the Pt and Ni are already intimately mixed before the mixture is heated under a reducing atmosphere to form the alloy. This decreases the time and temperature needed to form the alloy. The claimed invention forms an alloy between nickel powder and a Pt resin. Rather than forming a homogeneous alloy, it is thought that an "eggshell" structure is formed as previously discussed.

Ni alone is not as oxidation resistant as Pt. It is unexpected that such a low concentration of Pt could lead to such oxidative stability. A 95:5 weight ratio of Ni/Pt is a 98.4:1.6 mol ratio of Ni/Pt. Pt is far more expensive than Ni so any alloys, to be commercially practicable, must contain little Pt. The current invention shows unexpected oxidative stability for an alloy rich in Ni and deficient in Pt. It is believed that an "eggshell" structure alloy is formed with the outer layer of the Ni powder rich in Pt and an inner core of Ni containing very little Pt. Thus the alloy formed is not homogeneous. Furthermore, the current invention demonstrates that high temperatures (1300°C) are required to form the most oxidation resistant Ni/Pt alloy. Note in Figure 1 that heat treatment above 1000°C provides by far the best results.

In summary, neither cited reference, GB2242203 nor JP04041676, teach heat treating a Ni/Pt alloy over 1000°C in a reducing atmosphere. Therefore, even if the references were combined, one would not get this unexpected result. The oxidative stability of Ni powder (95 wt. %) mixed with Pt (5 wt. %) is much improved (Figure 1) when heat treated over 1000°C in a reducing atmosphere. The other unexpected result besides the temperature of the heat treatment is that a composition with so little Pt compared to Ni could be so oxidatively stable. A homogeneous alloy between Pt and Ni requires 10 to 15 wt. % Pt to have the same oxidative

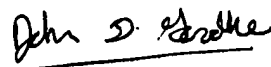
stability as a heterogeneous alloy of the present invention that contains 5 wt. % Pt. These unexpected results are secondary indicia of non-obviousness. "A showing that the claimed compounds possess unexpectedly advantageous or superior properties will rebut a prima facie case of obviousness based on structural similarity." In re Papesch, 315 F.2d 381 (CCPA 1963).

Therefore, it is respectfully submitted that the Examiner should find all claims allowable.

A check for the RCE and for the five additional independent claims over three is enclosed. No other fees or extensions of time are believed to be due in connection with this amendment; however, consider this a request for any extension inadvertently omitted, and charge any additional fees to Deposit Account No. 26-0084.

Reconsideration and allowance is respectfully requested.

Respectfully submitted,



JOHN D. GOODHUE, Reg. No. 47,603
McKEE, VOORHEES & SEASE, P.L.C.
801 Grand Avenue, Suite 3200
Des Moines, Iowa 50309-2721
Phone No. (515) 288-3667
Fax No. (515) 288-1338
CUSTOMER NO: 22885

Attorneys of Record

- bja -